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AXIALLY SYMMETRIC RELATIVISTIC THIN DISKS AND SPHEROIDAL HALOS WITH MAGNETICALLY POLARIZED MATTER

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A family of relativistic models of thin disks and spheroidal haloes with magnetically polarized material source it is presented. The models are built using exact solutions of the Einstein-Maxwell equations for a conformastatic and axially symmetric spacetime, by assuming that the material content of the halo is described by a non-dissipative anisotropic fluid and that the magnetic polarization it is proportional to the magnetic field. The solutions are obtained by expressing the metric function in terms of an auxiliary function which satisfies the Laplace equation, a characteristic property of the conformastatic spacetimes, and by using the displace, cut, and reflect method, which introduces a discontinuity in the first zderivative of the metric tensor across the plane of the disk. Once a solution to the system of equations is obtained, not only the solution of the Einstein-Maxwell equations but also the energy-momentum tensor is completely determined, which describes the matter content of the halo and the disks, as well as the variables associated with the magnetic field and the magnetic polarization. The energy densities of the disk and the halo are everywhere positive and well behaved, and their energy-momentum tensor agrees with all the energy conditions.

Nivel de formación

Pregrado

Autores primarios: Dr. GONZÁLEZ, Guillermo A (Universidad Industrial de Santander); GONZÁLEZ OGLIASTRI, Nicolás (Universidad Industrial de Santander)

Presentador: GONZÁLEZ OGLIASTRI, Nicolás (Universidad Industrial de Santander)

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